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Micromedia ProQuest

20 Victoria Street
Toronto, Ontario M5C 2N8
Tel: (416) 362-5211
Toll free: 1-800-387-2689
Fax: (416) 362-6161

Ontario

Ontario Ministry of Agriculture and Food

2002 SUPPLEMENT

Field Crop Protection Guide

Publication 812S

This supplement contains changes/additions/deletions to product recommendations from the original Publication 812.
For complete product recommendations, refer to the original publication and include these changes.

TABLE 1–3. Seed Treatments (page 13)

TRADE NAME	Active Ingredient	Formulation	Crops	Manufacturer	Ontario Sch.[1]
Fungicides					
Allegiance FL	metalaxyl	F	soybeans, forages, corn, cereals, canola	Gustafson Partnership	3
Apron XL LS	metalaxyl-M	LS	soybeans, corn, canola, wheat, forages, beans	Syngenta Crop Protection	2
Dividend XL	difenoconazole + metalaxyl-M	F	wheat	Syngenta Crop Protection	2
Dividend XL RTA	difenoconazole + metalaxyl-M	F	wheat	Syngenta Crop Protection	2
Maxim 480FS	fludioxonil	F	corn, soybeans	Syngenta Crop Protection	2
Raxil 250 FL	tebuconazole	F	wheat, barley, oats	Gustafson Partnership	2
Fungicides With Insecticides					
Helix Xtra	thiamethoxam + difenoconazole + metalaxyl-M + fludioxonil	F	canola	Syngenta Crop Protection	2

DB = Drill Box Application EC = Emulsifiable Concentrate F = Flowable LS = Liquid Suspension P = Powder
1 The numbers identify the Schedules in which the TRADE NAME products listed in this table are classified under the *Pesticide Act*. See Appendix C, Ontario Classification Schedules, on page 59 for an explanation of schedules.

TABLE 1–4. Fungicides (page 14)

TRADE NAME	Active Ingredient	Fungicide Classification	Days to Harvest	Relative Toxicities	Aerial Application	Manufacturer	Use and Remarks	Ontario Schedule[1]
Botran 75 W	dichloran	nitroaniline	2	Low	Yes	Gowan Company	field beans	3
Bravo 500	chlorothalonil	chloronitrile	30	Low	Yes	Syngenta Crop Protection	wheat	3
Folicur 432F	tebuconazole	conazole	30	Low	Yes	Bayer	wheat	2
Quadris	azoxystrobin	strobilurin	30	Low	Yes	Syngenta Crop Protection	canola	2
Tilt 250E	propiconazole	triazole	14 corn, 45 cereals, 60 canola	Low	Yes	Syngenta Crop Protection	wheat, oats, barley, corn, canola, soybeans (for seed only)	2

TABLE 1–5. Insecticides (page 15)

TRADE NAME	Active Ingredient	Insecticide Classification	Days to Harvest	Relative Toxicities	Aerial Application	Manufacturer	Use and Remarks	Ontario Schedule[1]
Cymbush 250 EC	cypermethrin	pyrethroid	30 canola 5 corn	Moderate	Yes	Syngenta Crop Protection	corn, canola Toxic to bees.	2
Force 3G	tefluthrin	pyrethroid	Planting time only	Moderate	No	Syngenta Crop Protection	corn	2
Matador 120 E	cyhalothrin-lambda	pyrethroid	14 corn, 50 canola, 28 wheat	Moderate	Yes	Syngenta Crop Protection	corn (2 aerial), canola, alfalfa (1 aerial), wheat, barley, oats	5

E = Emulsifiable Concentrate EG = Extruded Granular F = Flowable WP = Wettable Powder

1 The numbers identify the Schedules in which the TRADE NAME products listed in this table are classified under the *Pesticide Act*. See Appendix C, Ontario Classification Schedules, on page 59 for an explanation of schedules.

2. Corn (Field and Seed)

INSECTS

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
WIREWORMS (PAGE 18)			**per 100 kg seed**	
Seed Treatment Expect only 60%–70% control using seed treatments. Risk factors include: history of cereal/corn/grassy weeds, sandy soils, history of wireworm problems, coming out of sod. Threshold is 1 wireworm/bait trap. For bait trap information, see OMAF Publication 811, *Agronomy Guide for Field Crops*.	diazinon + lindane + captan	Agrox B-3 Agrox D-L Plus	340 g 200 g	For all seed treatments use full rate and ensure good coverage of seed. Available as 2 kg container and will treat 600 kg of corn seed. Available as a 600 g container and will treat 300 kg of corn seed. Use this product only on seed previously treated with captan or thiram.
		DL + C	200 g	Use this product only on seed previously treated with captan or thiram.
	imidacloprid	Gaucho 480 FL	520 mL	For seed corn only. Emergency registration only, expires **March 2003**. Ensure good coverage. For use in commercial seed treaters only.
BLACK CUTWORM (PAGE 19)			**per ha (per ac)**	
Rescue Treatments Scout early! Cutworms are easier to control when small. Look for leaf feeding (pinholes) by young climbing larvae as first sign of damage. If more than 10% of plants show leaf feeding, treating at this time gives nearly 100% control.	permethrin	Pounce EC	175–390 mL (70–156 mL)	Seedling stage only. Apply under warm, moist conditions in evening or night when cutworms are most active. Do not disturb soil for 5 days after application.
	cypermethrin	Ripcord 400 EC	175 mL (70 mL)	Seedling stage only. Apply under warm, moist conditions in evening or night when cutworms are most active. Do not disturb soil for 5 days after application. 21 days to harvest.
	chlorpyrifos	Lorsban 4E	1.2–2.4 L (480–960 mL)	Seedling stage only. 70 days to harvest.
		Pyrinex 480 EC	1.2–2.4 L (480–960 mL)	Seedling stage only. Apply once/season. 7 days to harvest.

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
	cyhalothrin-lambda	Matador 120 EC	83 mL (34 mL)	Seedling stage only. Ground or aerial application. Apply under warm, moist conditions in evening or night when cutworms are most active. Do not disturb soil for 5 days after application. 14 days to harvest. 3 applications/season, 2 may be by air.
EUROPEAN CORN BORER (PAGE 20)				
Seed corn only See OMAF Publication 811, *Agronomy Guide for Field Crops*, to calculate economic thresholds.	deltamethrin	Decis 5.0 EC	250–300 mL (100–120 mL)	Ground or aerial application. Apply when egg masses begin to hatch but no later than when 1st pinhole feeding occurs on foliage. For 2nd brood in late planting, apply before tassels show. Repeat in 58 day intervals. Maximum 3 applications/yr. Do not feed silage or stubble to dairy cattle.
	cypermethrin	Cymbush 250 EC Ripcord 400	280 mL (112 mL) 175 mL (70 mL)	Ground or aerial application. Apply when egg masses begin to hatch but no later than when 1st feeding occurs on foliage. For 2nd brood in late planting, apply before tassels show. Use a minimum 300–500 L water/ha for ground application and 11–22 L/ha for aerial appli cation. Re-entry period when foliage dries. Maximum 3 applications/yr. 5 days to harvest. Up to 2 applications/season by air.
	cyhalothrin-lambda	Matador 120 E	83 mL (34 mL)	Ground or aerial application. Spray no later than 1st appearance of feeding. Spray no later than 14 days before silage harvest. No more than 3 applications/season, 2 may be by air.
	Bacillus thuringiensis	Dipel 2X DF	0.56–1.12 kg (0.22–0.45 kg)	Good option for organically grown corn. Apply when pinhole feeding is observed in at least 5% of the plants. Repeat at 7 day intervals. Only effective against small larvae and must be applied before larvae begin stalk boring.
	carbaryl	Sevin XLR Plus	2.5–4.0 L (1.0–1.6 L)	For larvae in whorls and foliage, treat entire plant. Repeat as necessary. For silks and ears, apply in 24 day intervals when silks first appear. 1 day to harvest. Follow precautions applying to honeybees.
ARMYWORM (TRUE AND FALL) (PAGE 21)			**per ha (per ac)**	
Five–6 larvae in an area 30 x 30 cm warrant chemical control. Treat if larvae < 2.0 cm long and threshold has been exceeded. If larvae have white eggs attached to them they are parasitized and may not need treatment.	trichlorfon	Dylox 420	1.5–2.75 L (600–1100 mL)	No more than 3 applications/season.
	carbaryl	Sevin XLR Plus	2.5–4.0 L (1.0–1.6 L)	For larvae in whorls and foliage, treat entire plant. Repeat as necessary. For silks and ears, apply in 24 day intervals. 1 day to harvest. Follow precautions regarding honeybees.
	cyhalothrin-lambda	Matador 120 E	83 mL (34 mL)	Ground or aerial application. Spray no later than 1st appearance of feeding. Spray no later than 14 days before silage harvest. No more than 3 applications/season, 2 may be by air.
CORN EARWORM (PAGE 21)				
Insecticides have generally not provided economic control of CEW in field corn. There may be some value in treating seed corn to maintain kernel quality.	cyhalothrin-lambda	Matador 120 E	83 mL (34 mL)	Ground or aerial application. Spray no later than 1st appearance of feeding. Spray no later than 14 days before silage harvest. No more than 3 applications/season, 2 may be by air.

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
	cypermethrin	Cymbush 250 EC Ripcord 400 EC	280 mL (112 mL) 175 mL (70 mL)	Ground or aerial application. Ensure good coverage of ears and silks. Use minimum 300–500 L/ha of water for ground application and 11–22 L/ha for aerial application. 5 days to harvest. Maximum of 3 applications/yr, 2 may be by air.
FLEA BEETLES (PAGE 21)				
Seed Treatment Flea beetles are a vector of Stewart's bacterial wilt. It is uneconomical to spray corn with insecticides to protect against Stewart's wilt except in seed corn with highly susceptible inbreds.	imidacloprid	Gaucho 480 FL	**per 100 kg seed** 520 mL	For seed corn only. Emergency registration only, expires **March 2003**. Ensure good coverage. For use in commercial seed treaters only.

DISEASES

TABLE 2–2. Corn (Field and Seed) Seed and Soil Applied Fungicide Recommendations (page 22)

			Corn Diseases				
Active Ingredients	**Product**	**Formulation**	**Fusarium Seedling Blight**	**Rhizoctonia Damping-off**	**Pythium Damping-off**	**Aspergillus Seed Rot**	**Penicillium Seed Rot**
INSECT AND DISEASE CONTROL							
Untreated Seed							
diazinon + lindane + captan	Agrox B-3	P (DB)	+	—	+	—	—
Seed Pretreated With Fungicide							
diazinon + lindane + captan	Agrox D-L Plus	P (DB)	**For insect control only. Disease control via fungicide pretreatment.**				
diazinon + lindane + captan	DL+C	P (DB)					
DISEASE CONTROL							
captan	Captan Flowable	F	+	—	—	—	—
carbathiin + thiram	Vitaflo-280	F	+	+	—	—	—
fludioxonil	Maxim 480 FS	F	+	+	—	+	+
metalaxyl	Allegiance FL	F	—	—	+	—	—
metalaxyl	Apron FL	F	—	—	+	—	—
metalaxyl-M	Apron XL	LS	—	—	+	—	—

DB = Drill Box Application F= Flowable LS = Liquid Suspension P= Powder
+ = Recommended for disease listed — = NOT recommended

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions etc.)
DAMPING-OFF *PYTHIUM* (PAGE 22)				
Seed Treatment			**per 100 kg seed**	
Can occur on all soil types but losses are greatest in cold, wet, clay soils. Minimize soil compaction and remove excess moisture through increased drainage. Plant when soil temperatures above 13°C (55°F). Treat seed with metalaxyl or metalaxyl-M. No known resistance but some degree of tolerance available in hybrids. Rotation has limited effect.	metalaxyl-M	Apron XL LS	20–40 mL	Do not use in hopper-box, planter-box, slurry-box or other non-commercial seed treatment applications at or immediately before planting. Do not graze or cut for forage within 4 weeks after planting. Read label for information regarding resistant strains of fungus.
	metalaxyl	Allegiance FL	46–110 mL	Do not graze or feed livestock on seeded area for 4 weeks after planting.
		Apron FL	46–110 mL	
GRAY LEAF SPOT (PAGE 24)				
Confirmed to be present in Ontario in 2001. Some hybrids are tolerant to the disease. Crop rotation and tillage reduces inoculum levels in surface residues. In reduced tillage systems, rotation and resistance are necessary. Chemical control not usually economical in field corn.	propiconazole	Tilt 250 E	**per ha (per ac)** 500 mL (200 mL)	Ground and aerial application. Apply when disease first appears. Can be tank mixed with Ripcord insecticide for insect and disease control. 14 days to harvest.

3. Soybeans

INSECTS

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
SOYBEAN APHID				
Aphid infestations are more likely to cause yield reduction if the plants are already suffering from drought conditions or another stress factor. Refer to the OMAF Web site at www.gov.on.ca/OMAF/english/crops/field/soybeans for more information on thresholds and management options.	dimethoate	Cygon 480 AG	**per ha (per ac)** 1 L (0.4 L)	Use high volume, high pressure and ensure good coverage. Do not feed or allow livestock to graze on treated forage. Do not apply within 30 days of harvest.

DISEASES

TABLE 3–1. Soybean Seed and Soil Applied Fungicide Recommendations (page 26)

Active Ingredients	Product	Formulation	Soybean Diseases				
			Phytophthora sojae	Pythium Damping off	Phomopsis Seed Mould	Rhizoctonia damping off	Fusarium Seedling Blight
INSECT AND DISEASE CONTROL							
Untreated Seed							
diazinon + lindane + captan	Agrox B-3	P (DB)	—	+	—	—	+
Seed Pretreated With Fungicide							
diazinon + lindane + captan	Agrox D-L Plus	P (DB)	For insect control only. Disease control via fungicide pretreatment.				
diazinon + lindane + captan	D.L.+C.	P (DB)					
DISEASE CONTROL							
captan	Captan	F	—	+[1]	+	—	+
carbathiin + thiram	Anchor	F (DB)	—	—	+	+	+
carbathiin + thiram	Vitaflo-280	F	—	—	+	+	+
fludioxonil	Maxim 480FS	F	—	—	—	+	+
metalaxyl	Allegiance FL	F	+	+	—	—	—
metalaxyl	Apron FL	F	+	+	—	—	—
metalaxyl-M	Apron XL	LS	+	+	—	—	—

DB = Drill Box Application F = Flowable P = Powder LS = Liquid Suspension

+ = Recommended for disease listed — = NOT recommended [1] Pythium control with captan can be inconsistent.

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
PHYTOPHTHORA ROOT ROT (PAGE 26)				
Seed Treatment			**per 100 kg seed**	
Select soybean varieties that have both specific resistance (Rps genes such as 1K and 1C) and good partial resistance (tolerance) to all races of *Phytophthora*. Consult your seed company for variety profiles. Primarily controlled through resistant varieties. Losses greatest in cold, wet, clay soils. Minimize soil compaction and remove excess moisture through increased drainage. A small amount of tillage helps warm soil and increase surface drainage. Rotate with corn and wheat. Plant when soil temperatures are above 13°C (55°F). Treat seed with metalaxyl or metalaxyl-M.	metalaxyl-M	Apron XL-LS	40 mL	Do not use in hopper-box, planter-box, slurry-box or other non-commercial seed treatment applications at or immediately before planting. Do not graze or feed livestock on seeded area for 4 weeks after planting. Read label for information regarding resistant strains of fungus.
	metalaxyl	Allegiance FL Apron FL	46–93 mL 46–93 mL	Do not graze or feed livestock on seeded area for 4 weeks after planting.

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
RHIZOCTONIA DAMPING OFF (PAGE 27)				
Seed Treatment			**per 100 kg seed**	
Can occur on all soil types and environmental conditions. Disease losses greatest when a dry spring is followed by wet conditions. Few management options exist since no resistant or tolerant varieties available. Crop rotation with corn and small grains can help minimize the disease.	fludioxynil	Maxim 480FS	5.2–10.4 mL	For commercial application only. Do not use in hopper-box, planter-box, slurry-box or other non-commercial seed treatment applications at or immediately before planting.
	carbathiin + thiram	Anchor	600 mL	Drill box application. Ensure uniform coverage on seed. Do not apply Anchor through commercial seed treating equipment or through an auger as excessive seed wetness may result. Do not graze or feed livestock on treated areas for 4 weeks after planting.
		Vitaflo 280	260 mL	Do not store treated soybean seed. May be applied through commercial seed treatment equipment or auger. Ensure uniform coverage.
PYTHIUM DAMPING OFF (PAGE 27)				
Seed Treatment				
Can occur on all soil types but losses are greatest in cold, wet, clay soils. Minimize soil compaction and remove excess moisture through increased drainage. Plant when soil temperatures above 13°C (55°F). Treat seed with metalaxyl or metalaxyl-M. No known resistance but some degree of tolerance available in cultivars. Rotation has limited affect.	metalaxyl-M	Apron XL LS	20–40 mL	Do not use in hopper-box, planter-box, slurry-box or other non-commercial seed treatment applications at or immediately before planting. Do not graze or feed livestock on seeded area for 4 weeks after planting. Read label for information regarding resistant strains of fungus.
	metalaxyl	Allegiance	46–93 mL	Do not graze or feed livestock on seeded area for 4 weeks after planting.
		Apron FL	46–93 mL	
	diazinon + lindane + captan	Agrox B-3	320 g	Available as a 2 kg container and will treat 625 kg of soybean seed. Use full rate and ensure good coverage of seed.
FUSARIUM SEEDLING BLIGHT (PAGE 28)				
Seed Treatment				
Cool, wet spring conditions favour infection. Resistant varieties not available. Minimize soil compaction and remove excess moisture through increased drainage. A small amount of tillage helps warm soil and increase surface drainage. Rotate with corn and wheat. Plant high quality seed when soil temperatures are above 13°C (55°F). Fungicide seed treatment recommended. Mounding or ridging soil at the base of the plants produce adventitious roots that can minimize losses.	fludioxynil	Maxim 480FS	5.2–10.4 mL	For commercial application only. Do not use in hopper-box, planter-box, slurry-box or other non-commercial seed treatment applications at or immedi ately before planting.
	carbathiin + thiram	Anchor	600 mL	Drill box application. Ensure uniform coverage on seed. Do not apply Anchor through commercial seed treating equipment or through an auger as excessive seed wetness may result. Do not graze or feed livestock on treated areas for 4 weeks after planting.
		Vitaflo 280	260 mL	Do not store treated soybean seed. May be applied through commercial seed treatment equipment or auger. Ensure uniform coverage.
	diazinon + lindane + captan	Agrox B-3	320 g	Available as a 2 kg container and will treat 625 kg of soybean seed. Use full rate and ensure good coverage of seed.
	captan	Captan Flowable	280 mL	Mix with the amount of water required for the slurry treater equipment to be used.

4. Forages

INSECTS

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
ALFALFA WEEVIL (PAGE 29)				
First Cut: If 40% of stems have feeding damage in tips, cut and remove from fields as soon as possible. If this level of damage occurs a week or more before optimum cutting time, then spray may be necessary. Second Cut: If damage was serious on first cut, feeding may continue and early re-growth should be carefully checked. Natural enemies are generally highly effective at controlling this pest. For the safety of these natural enemies, chemical control is not recommended unless pest population exceeds the action threshold. See OMAF Publication 811, *Agronomy Guide for Field Crops*, for more information on action thresholds.			**per ha (per ac)**	
	phosmet	Imidan 50 WP	2.25 kg (900 g)	Alfalfa only. Ground application only. Do not apply during bloom. Only 1 application per cutting. 7 days to cutting or grazing.
	cyhalothrin-lambda	Matador 120 E	83 mL (34 mL)	Alfalfa only. Ground or aerial application. Apply when larvae are small and pop ulations are high. Maximum of 3 applications/year, 1 may be by air. 14 days to cutting or grazing. 24-hr. re-entry period. Do not graze or feed lactating dairy animals on treated forage.
	azinphos-methyl	Guthion Solupak 50 WP	1.12–1.75 kg (0.45–0.7 kg)	Alfalfa and clover only. Use a minimum of 80 L of water/ha for ground application and 40 L/ha for aerial application. 21 days to harvest. Minimum re-entry period of 48 hr. Only 1 application/cutting. Back pack and hand-wand spraying prohibited.
		Guthion 240 SC	2.25–3.5 L (0.9–1.4 L)	
		Sniper 50 W Clean Pak	1.12–1.75 kg (0.45–0.7 kg)	
		Sniper 240 E	2.25–3.5 L (0.9–1.4 L)	
POTATO LEAFHOPPERS (PAGE 30)				
Leafhoppers are most severe in new seedings and in regrowth under hot dry weather. Some resistant varieties having glandular hairs on the leaves and stems have been found to be effective. Use chemical control only if leafhoppers exceed the threshold, as insecticides will also kill effective natural enemies of alfalfa weevil. See OMAF Publication 811, *Agronomy Guide for Field Crops* for threshold charts.	dimethoate	Cygon 480 E	425 mL (170 mL)	Alfalfa, forage and pasture. Ground and aerial application. Do not apply during bloom. 2 days to harvest and grazing. No more than 2 applications/season.
		Lagon 480 EC	425 mL (170 mL)	
	cyhalothrin-lambda	Matador 120 E	83 mL (34 mL)	Alfalfa only. Ground or aerial application. Timing of application should be based on the presence of vulnerable pest development stages and significant populations only. Maximum of 3 applications/yr, 1 may be by air. 14 days to cutting or grazing. 24 hr. re-entry period. Do not graze or feed lactating dairy animals on treated forage.
	azinphos-methyl	Guthion Solupak 50 WP	1.12–1.75 kg (0.45–0.7 kg)	Alfalfa and clover only. Use a minimum of 80 L of water/ha for ground application and 40 L/ha for aerial application. 21 days to harvest. Minimum re-entry period of 48 hr. Only 1 application/cutting. Back pack and hand-wand spraying prohibited.
		Guthion 240 SC	2.25–3.5 L (0.9–1.4 L)	
		Sniper 50 W Clean Pak	1.12–1.75 kg (0.45–0.7 kg)	
		Sniper 240 E	2.25–3.5 L (0.9–1.4 L)	

Integrated Pest Management Options GRASSHOPPERS (PAGE 30)	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
			per ha (per ac)	
Begin scouting in late June when grasshoppers are still young. Spraying insecticides on alfalfa also kills the natural enemies of alfalfa weevil and lygus bugs.	malathion	Malathion 500 EC	2.25–2.75 L (0.9–1.1 L)	For alfalfa and clover. Do not apply during bloom. Apply when 75% of foliage shows feeding damage. Less effective below 20°C (68°F). 7 days to cutting or grazing.
	cyhalothrin-lambda	Matador 120 E	63–83 mL (26–34 mL)	Alfalfa only. Ground or aerial. Use higher rate when grasshoppers are larger, up to but not including winged adults (up to 2.5 cm in length) or when population is high. Ground application only. Maximum of 3 applications/yr, 1 may be by air. 24 hr. re-entry period. 14 days to cutting or grazing. Do not graze or feed lactating dairy animals on treated forage.
	azinphos-methyl	Guthion Solupak 50 WP	525–850 g (210–340 g)	Alfalfa and clover only. Use a minimum of 80 L of water/ha for ground application and 40 L/ha for aerial application. Minimum re-entry period of 48 hr. Only 1 application/cutting. Back pack and hand-wand spraying prohibited. 21 days to harvest.
		Guthion 240 SC	1.1–1.75 L (440–700 mL)	
		Sniper 240 E	1.1–1.75 L (440–700 mL)	

DISEASES

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
SEED AND ROOT ROT				
PHYTOPHTHORA ROOT ROT (PAGE 31)				
Seed Treatment			**per 100 kg seed**	
Plant resistant varieties that are treated with metalaxyl or metalaxyl-M. Drain excess moisture and avoid compaction. Avoid stresses such as insects, weeds and untimely cuttings that may stress the plants and make them more susceptible to *Phytophthora*. Do not cut during wet conditions. Crop rotation has little affect on the disease. Promote lateral root growth with good fertility program.	metalaxyl-M	Apron XL LS	40 mL	For alfalfa, clover, and forage grasses. Do not use in hopper-box, planter-box, slurry-box or other non-commercial seed treatment applications at or immediately before planting. Do not graze or feed livestock on seeded area for 4 weeks after planting. Read label for informa tion regarding resistant strains of fungus.
	metalaxyl	Allegiance	46–110 mL	Do not graze or feed livestock on seeded area for 4 weeks after planting.
		Apron FL	46–110 mL	
PYTHIUM DAMPING OFF (PAGE 32)				
Seed Treatment				
Fungicide seed treatment. Drain excess moisture and avoid compaction. Plant when soil and weather conditions favour rapid emergence and early growth of seedlings. Increase plant populations to compensate for any plant losses.	metalaxyl-M	Apron XL LS	20–40 mL 40 mL	Use 20–40 mL for forage grasses. Use 40 mL for alfalfa, clover, trefoil and vetch. Do not use in hopper-box, planter-box, slurry-box or other non-commercial seed treatment applications at or immediately before planting. Do not graze or feed livestock on seeded area for 4 weeks after planting. Read label for information regarding resistant strains of fungus.
	metalaxyl	Allegiance	46–110 mL	Do not graze or feed livestock on seeded area for 4 weeks after planting.
		Apron FL	46–110 mL	

5. Cereals

INSECTS

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
WHEAT, BARLEY, OATS and RYE				
GRASSHOPPERS (PAGE 34)				
			per ha (per ac)	
More abundant in drier years. If populations are high enough, wheat heads may be clipped. Seedling winter wheat is also at risk. Infestations usually begin along field borders. Early season weed control can help eliminate food source for early season nymphs, however, late season weed control in and around the field actually causes this insect to migrate from the weeds onto the crop and cause damage. If populations are high, spot spray in border areas that are infested before migration into the field occurs.	malathion	Malathion 500 EC	2.25–2.75 L (900–1100 mL)	7 days to harvest. Less effective below 20°C (68°F).
	cypermethrin	Ripcord 400 EC	50–70 mL (20–28 mL)	Ground and aerial application. Use lower rates for small grasshoppers and when soil temperatures are cool (15–20°C). Avoid spraying when temperatures are above 25°C. Repeat treatment as necessary. Do not graze treated crop or cut for hay. 60 days to harvest.
	cyhalothrin-lambda	Matador 120 E	63–83 mL (26–34 mL)	Ground or aerial application. Apply the low rate when grasshoppers are up to the 3rd nymphal stage (up to 1 cm in length) or when insect numbers are low. Apply the high rate when grasshoppers are larger, up to but not including winged adults (up to 2.5 cm in length) or when insect numbers are high. 3 applications/yr, 2 may be by air. 14 day interval from application to harvest or foraging. Do not graze or feed lactating dairy animals on treated green cereal forage or treated pasture. In wheat, do not apply within 28 days of harvest or 14 days of livestock foraging. In barley and oats do not apply within 28 days of harvest or 14 days of livestock foraging.
	carbaryl	Sevin XLR Plus	1.25–2.5 L (0.5–1.0 L)	14 days to harvest for wheat, rye and oats. 28 days to harvest for barley. See precautions applying to honey bees.
	azinphos-methyl	Guthion Solupak 50 WP	525–850 g (210–340 g)	For rye only. Use minimum of 80 L of water/ha for ground and 40 L/ha for aerial application. Apply only once/season. Do not harvest for food, feed or forage within 30 days of treatment. Minimum re-entry period is 48 hr.
		Guthion 240 SC	1.1–1.75 L (440–700 mL)	
		Sniper 50 W Clean Pak	525–850 g (210–340 g)	
		Sniper 240 E	1.1–1.75 L (440–700 mL)	

WHEAT DISEASES

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
FOLIAR, STEM AND HEAD DISEASES (See OMAF Publication 811, *Agronomy Guide for Field Crops* for Zadok's cereal growth				
FUSARIUM HEAD BLIGHT (PAGE 42)				
Warm and prolonged wet conditions during flowering are necessary for infection to occur. Avoid planting into corn stubble since the fungus also causes Gibberella stalk rot in corn. Wheat should follow soybeans in the rotation. Remove or plough-down corn residues. See fusarium forecasting Web page at www.ridgetownc.uoguelph.ca/CoInfo/OWN/Fusarium/Fusarium_Frame.htm to determine the fusarium head blight risk for your area. Apply only when risk is high. Consult your local crop advisor for forecast information.	tebuconazole	Folicur 432 F	292 mL (117 mL)	Timing is critical. Heads need to be fully emerged (Zadoks 59). Spray within 2–5 days of head emergence. Ensure entire heads are covered. Apply in minimum of 94 L/ha of water. Emergency registration only, expires **Sep. 2002**.
SEPTORIA GLUME BLOTCH				
Prolonged wet periods in May and early June resulti n increased disease incidence. Rotation with crops other than cereals, plowing down of cereal residues and removal of volunteer wheat reduces suvivability of the fungi.	chlorothalonil	Bravo 500	**per ha (per ac)** 1.5–2.5 L (0.6 –1.0 L)	Apply at Zadok's growth stage 37 (flag leaf emergence) and repeat 10-14 days later at growth stage 51–55 (visible ear). A 3rd application at growth stage 59–69 (ear fully emerged) may be necessary if conditions favour disease spread. Maximum 3 applications/yr. 30 days to harvest.

OAT DISEASES

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
SEED ROTS AND SEEDLING DISEASES				
COVERED SMUT (COMMON BUNT) LOOSE SMUT (PAGE 45)				
Seed Treatment			**per 100 kg seed**	
Spread from year to year primarily through infected seed. Wind blown spores infects florets within season. Use a fungicide seed treatment on infected seed.	carbathiin + thiram	Vitaflo 280	330 mL	Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole	Raxil 250 FL	240–360 mL	For Loose Smut control only. Do not graze or fee livestock on treated areas for 4 weeks after planting.

6. Dry Edible Beans

DISEASES

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
SEED ROTS AND SEEDLING DISEASES				
PYTHIUM DAMPING OFF (PAGE 47)				
			per 100 kg seed	
Can occur on all soil types but losses are greatest on wet, clay soils. Minimize soil compaction and remove excess moisture through increased drain age. Seed should be treated with metalaxyl or metalaxyl-M and plant into warm soils 16°C (60°F). Rotate 3–4 yr between bean crops.	metalaxyl-M	Apron XL LS	20–40 mL Apply with DCT	Do not use in hopper-box, planter-box, slurry-box or other non-commercial seed treatment applications at or immediately before planting. Do not graze or feed livestock on seeded area for 4 weeks after planting. Read label for information regarding resistant strains of fungus.
	metalaxyl	Allegiance FL Apron FL	46–110 mL 46–110 mL Apply with DCT	Do not graze or feed livestock on seeded area for 4 weeks after planting.
PHYTOPHTHORA ROOT ROT (PAGE 48)				
Can occur on all soil types but losses are greatest on wet, clay soils. Minimize soil compaction and remove excess moisture through increased drain age. Treat seed with metalaxyl or metalaxyl-M. Rotate 3–4 yr between bean crops.	metalaxyl-M	Apron XL LS	40 mL Apply with DCT	Do not use in hopper-box, planter-box, slurry-box or other non-commercial seed treatment applications at or immediately before planting. Do not graze or feed livestock on seeded area for 4 weeks after planting. Read label for information regarding resistant strains of fungus.
	metalaxyl	Allegiance FL Apron FL	46–110 mL 46–110 mL Apply with DCT	Do not graze or feed livestock on seeded area for 4 weeks after planting.

7. Canola

INSECTS

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
FLEA BEETLES (PAGE 50)				
Seed Treatment Hot, dry weather favours this pest. Fortunately, once the crop reaches the 3–4 leaf stage, the plants are generally established and can compensate for the feeding damage. If beetle damage in excess of 50% of the cotyledon or leaf area, and if the weather is warm and dry, a foliar insecticide may be needed. Canola is a valuable honey source and is well used by honeybees. Keep insecticide application to a minimum while the crop is in bloom.			**per 100 kg seed**	
	imidacloprid	Gaucho 480 FL	820–1,640 mL	Use higher rate if flea beetle populations are high.
	thiamethoxam + difenoconazole + metalxyl-M + fludioxonil	Helix Xtra	1.5 L	Not for use in hopper box, planter box, slurry box or other non-commercial seed treatment application.
	carbathiin + thiram + lindane	Vitavax RS	2.25 L	Do not graze or feed livestock on seed area for 4 weeks after planting.
Post Emergence				
	cypermethrin	Cymbush 250 EC Ripcord 400 EC	140 mL (57 mL) 50 mL (20 mL)	Ground or aerial application. 30 days to harvest. Ground application only. Apply when signs of insect damage appear. Repeat treatment if necessary. Use minimum 110 L of water per hectare. 30 days to harvest.
	deltamethrin	Decis 5 EC	100–150 mL (40–60 mL)	Ground or aerial application. 14 days to harvest.
	cyhalothrin-lambda	Matador 120 EC	83 mL (33 mL)	Ground or aerial application. Maximum 3 applications/yr, 1 may be by air. Do not apply within 50 days of harvest.
	carbaryl	Sevin XLR Plus	500 mL (200 mL)	Seedling stage only (up to 4 weeks after plant emergence). Ground and aerial application. 60 days to harvest.
	carbofuran	Furadan 480 F	150 mL (60 mL)	Apply 2 weeks after seeding or when insects first noticed. Ground and aerial application. Do not use less than 100 L of water. 60 days to harvest. Minimum period for re-entry is 48 hr.

DISEASES

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
SEEDLING DISEASES				
SEEDLING BLIGHT (PAGE 51)				
			per 100 kg seed	
Plant good quality seed when the conditions are good (warm) that promote rapid germination. Use a fungi cide seed treatment to increase stand establishment. Maintain a good fertility balance and avoid excess fertilizer which promotes disease and phytotoxicities. Avoid deep planting of seed.	thiamethoxam + difenoconazole + metalxyl-M + fludioxonil	Helix XTra	1.5 L	Not for use in hopper box, planter box, slurry box or other non-commercial seed treatment application.
	carbathiin + thiram	Vitavax RS Fungicide	1.25 L	Do not graze or feed livestock on seed area for 4 weeks after planting.
PYTHIUM DAMPING-OFF (PAGE 51)				
			per 100 kg seed	
Plant good quality seed when the conditions are good (warm) that promote rapid germination. Use metalaxyl or metalaxyl-M seed treatment to increase stand establishment. Maintain a good fertility balance and avoid excess fertilizer which promotes disease and phytotoxicities. Avoid deep planting of seed.	metalaxyl-M	Apron XL LS	20-40 mL	Do not use in hopper-box, planter-box, slurry-box or other non-commercial seed treatment applications at or immediately before planting. Read label for information regarding resistant strains of fungus.
	metalaxyl	Allegiance FL Apron FL	32-110 mL 32-110 mL	Do not graze or feed livestock on seeded area for 4 weeks after planting.
	thiamethoxam + difenoconazole + metalxyl-M + fludioxonil	Helix XTra	1.5 L	Not for use in hopper box, planter box, slurry box or other non-commercial seed treatment application.
BLACKLEG (PAGE 52)				
Seed Treatment There are differences in susceptibility between cultivars. Maintain at least 3 yr between canola crops. Fungicide seed treatments reduce seed-borne infection.	thiamethoxam + difenoconazole + metalxyl-M + fludioxonil	Helix XTra	1.5 L	Not for use in hopper box, planter box, slurry box or other non-commercial seed treatment application.
	carbathiin + thiram	Vitavax RS	1.25 L	Do not graze or feed livestock on seed area for 4 weeks after planting.

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